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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,423	11/21/2003	Eric R. Hansen	204560-73806	3387
<div>7590 BARMES &amp; THORNBURG 11 South Meridian Street Indianapolis, IN 46204</div>				
<div>09/02/2010</div>				
EXAMINER				
LU, JIPING				
ART UNIT		PAPER NUMBER		
3743				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/719,423

**Applicant(s)**

HANSEN ET AL.

**Examiner**

Jiping Lu

**Art Unit**

3743

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 June 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 and 31-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 19-29, 31-34 is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB-08)  
Paper No(s)/Mail Date 3/4/09
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claims Status***

1. The rejection of claims 26-29 and 31-34 under 35 USC 102(b) and the rejection of claims 19-25 under 35 USC 103(a) have been reversed by the BPAI on January 19, 2010. The rejection of claims 1-18 was affirmed by the BPAI with new grounds of rejection. The amendment to claims 1-18 filed on June 21, 2010 has been entered and claims 1-18 remain rejected as follows.

### ***Information Disclosure Statement***

2. The information disclosure statement filed 3/4/09 fails to comply with 37 CFR 1.97(d) because it lacks the fee set forth in 37 CFR 1.17(p). It has been placed in the application file, but the information referred to therein has not been considered.

### ***Claim Rejections - 35 USC § 103***

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Claims 1-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Branvold (U.S.Pat. 3,584,850) in view of Baukal, Jr. et al. (U. S. Pat. 5,413,476).

Brandvold discloses a mineral processing kiln 14 having an inclined rotary shell (a "vessel") 14c. Col. 4, 1.73- col. 5, 1. 5; col. 5 11. 60-67; fig. 1. Brandvold additionally discloses introducing combustion air and combustible fuel through a lower end 14b of the rotary shell 14c

Col. 6, 11. 8-19 and generating a flame at the lower end of the rotary vessel (col. 5, lines 17-19, fig. 1). Brandvold additionally discloses introducing additional air through tuyeres 24c (disposed in an "opening") in a wall of the rotary shell 14c at a location downstream, relative to a kiln gas stream, of the flame and between the lower end of the rotary vessel 14b and an upper end of the rotary shell 14a. Brandvold's tuyeres 24c are arranged to spiral the incoming cooling air to rapidly mix it with the heating fluid. Col. 6, 11.71-75. Brandvold does not disclose any particular stoichiometric condition of the fuel and air mixture supplied to the heating means, nor does Brandvold disclose that the air introduced at tuyeres 24c is used for additional combustion.

Baukal teaches a method for reducing the NO<sub>x</sub> levels of conventional burners, such as those used in rotary kilns, by staging combustion reactions. Col. 1, 11.43-46; col. 2, 11.45-50. Baukal stages the combustion reactions by providing a burner 1 supplied with oxidant gas 5 and fuel 7 in the wall 3 of a combustion volume or furnace. Baukal then introduces a second oxygen containing gas 15 into a flame 13 via a conduit 17 Col. 4, 1. 51- col. 5, 1. 3. Baukal teaches that various variables affect the NO<sub>x</sub> produced by a burner. These variables include the firing rate, the molar ratio of oxygen to fuel and the oxygen injection distance from the burner. Col. 7, 1.26 - col. 9, 1. 10. Baukal recognizes that the burner 1 may be operated above, below, or at, the stoichiometric level (i.e., 2.0 for O<sub>2</sub>:CH<sub>4</sub>). Col. 5, 11.4-9; col. 5, 1. 66- col. 6, 1.4; col. 7, 11.27-28; col. 7, 1.45. Baukal also recognizes that reducing the molar ratio of oxygen to fuel in the burner to a sub-stoichiometric level while maintaining the injection location constant, reduces the amount of NO<sub>x</sub> produced. Table 4; col. 8, 1.5 - col. 9, 1. 22. The subject matter of claim 1 involves no more than the application of Baukal's known technique to Brandvold's known device in order to achieve the predictable result of reducing NO<sub>x</sub> emissions and therefore would have been obvious

to one having ordinary skill in the art. With regard to the claimed numerical ranges of the combustion air mass flow rate, it is deemed to be an obvious matter of design choice since applicant has not established that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990) and since it had been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456 (CCPA 1955). Baukal demonstrates that the molar ratio of oxygen to fuel injected at the burner as compared to the overall molar ratio of oxygen to fuel injected is a variable which affects the resulting amount of NO<sub>x</sub> emissions. For combustion air having a fixed oxygen content the molar quantity of oxygen delivered to the burner is directly dependent upon the mass flow rate of the oxygen-containing combustion air delivered. Thus, introducing about 1% to about 15% by mass of the total combustion air downstream is essentially the same as introducing about 1% to about 15% by molar quantity of the total oxygen downstream. Baukal specifically mentions values within this range. See Baukal Table 4, claim 3. Even accounting for differences in oxygen content, one of ordinary skill in the art would recognize that optimization of the molar quantity of oxygen delivered to the burner, as compared to the overall amount, could be effected by altering the proportion of air injected downstream, as opposed to at the burner.

***Allowable Subject Matter***

5. Claims 19-29, 31-34 are allowed in view of BPAI Decision dated 1/19/2010.

***Response to Arguments***

6. Applicant's arguments filed 6/21/2010 have been fully considered but they are not persuasive for the reasons as set forth in the above rejection. First, claims 1-18 fail to define over the prior art patents. The applicant is requested to point out exactly which limitations from the claims that the prior art patents do not teach or show. Second, on page 12 of the Remarks, the applicant argues that by adding the limitation "the rotary vessel at a location downstream, relative to a kiln gas stream, of the flame" is unobvious. The Board's decision misapprehended or overlooked the basic operation of Brandvold's kiln. The examiner totally disagrees with the applicant's arguments because the claimed operation in claims 1-18 is clearly taught by the combined teachings of the prior art patents to Brandvold and Baukal. In particular, Brandvold does disclose introducing additional air through tuyeres 24e (disposed in an "opening") in a wall of the rotary shell 14c at a location downstream, relative to a kiln gas stream, of the flame and between the lower end of the rotary vessel 14b and an upper end of the rotary shell 14a. The applicant can not deny this disclosure. Third, on pages 12-14 of the Remarks, the applicant continues to argue the newly amended claims 1, 7 and 14 now require the limitation "the rotary vessel at a location downstream, relative to a kiln gas stream, of the flame of the rotary vessel" that the Baukal patent teaches away. This line of arguments is totally without merit because the primary patent to Brandvold clearly shows such conventional feature as set forth in the above rejection. The Baukal patent was used to show the teaching of Baukal combustion process operated above, below, or at, the stoichiometric level (i.e., 2.0 for O<sub>2</sub>:CH<sub>4</sub>). Col. 5, 11.4-9; col. 5, 1. 66- col. 6, 1.4; col. 7, 11.27-28; col. 7, 1.45. The Baukal does not teach away the broadly claimed invention. Therefore, the Board has properly affirmed the examiner's rejection of the

claims under the analysis of the KSR. In particular, the Board stated the subject matter of claim 1 involves no more than the application of Baukal's known sub-stoichiometric combustion technique to Brandvold's known device as stated in the Facts 1-9 of the Board decision. It is noted the applicant did not dispute the facts found by the Board. Therefore, the Board has determined that one skilled in the art would understand that when incorporating Baukal's teachings in sub-stoichiometric combustion operation into the rotary kiln device of Brandvold. Fourth, on pages 14-15 of the Remarks, the applicant argues that the dependent claims 8 and 13 are patentable because claims 8 and 13 further require the "introduction of additional combustion air at a location within the calcining zone of the rotary vessel". The examiner disagrees for the reasons set forth in the previous final rejections because the applicant fails to point out exactly which limitations from the broad claims 1-18 that the Brandvold and Baukal patents teach away. Finally, on page 15 of the Remarks, the applicant argues that other dependent claims 2-6, 9-12 and 15-18 are also patentable. The examiner disagrees for the reasons as set forth in the previous final rejection.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jiping Lu whose telephone number is 571 272 4878. The examiner can normally be reached on Monday-Friday, 9:00 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, KENNETH RINEHART can be reached on 571-272-4881. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jiping Lu/  
Primary Examiner  
Art Unit 3743

J. L.



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